

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A process for preparing a porous wiring interlayer insulating film having very low dielectric constant for a semiconductor comprising the steps of:

a) preparing a mixed complex of matrix resin and pore-forming ~~organic molecules~~ material, the matrix resin is selected from the group consisting essentially of:

organosilane of Chemical Formula 1: $R^1_m R^2_n SiX_{4-m-n}$ (where each of R^1 and R^2 which may be the same or different, is a non-hydrolysable group selected from hydrogen, alkyl, fluorine-containing alkyl or aryl group; X is a hydrolysable group selected from halide, alkoxy or acyloxy; and m and n are integers of from 0 to 3 satisfying $0 \leq m+n \leq 3$) or a partially hydrolyzed condensate thereof;

organic bridged silane of Chemical Formula 2: $R^3_p Y_{3-p} Si-M-SiR^4_q Z_{3-q}$ (where each of R^3 and R^4 which may be the same or different, is a non-hydrolysable group selected from hydrogen, alkyl, fluorine-containing alkyl, alkenyl or aryl; each of Y and Z which may be the same or different, is a hydrolysable group selected from halide, alkoxy or acyloxy; M is alkylene or arylene group; and p and q are integers of from 0 to 2) or a cyclic oligomer with organic bridge unit (Si-M-Si) or a partially hydrolyzed condensate thereof; and

a mixture thereof; and

the pore-forming material containing an organic part having one or more thermally decomposable organic linkage groups, and at least one silyl functional group at the terminal of the pore-forming material so that the pore-forming material can be connected by covalent bonding with the matrix resin;

- b) coating the mixed complex on a substrate; and
- c) heating the mixed complex to remove the organic ~~molecules~~ part of the pore-forming material, thereby forming pores inside the complex.

2. (Canceled)

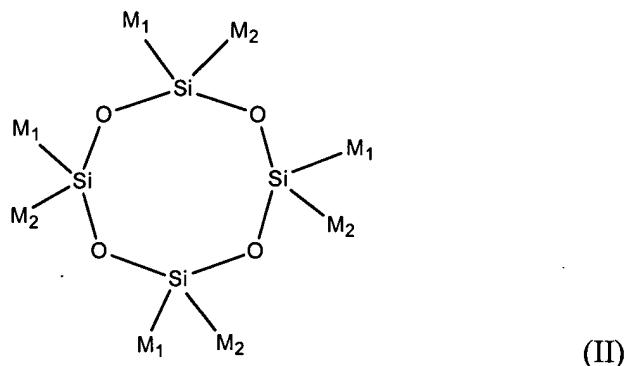
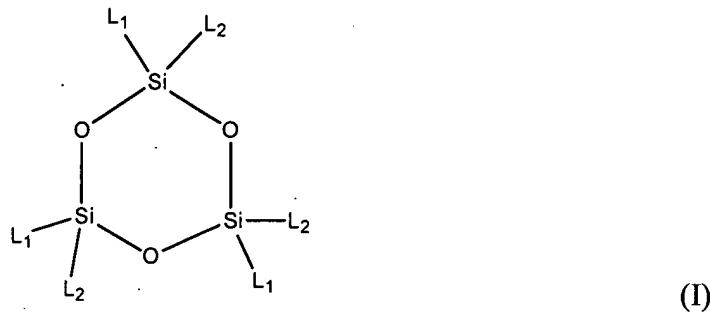
3. (Currently amended) The process according to claim[[2]] 1, wherein in the Chemical Formula 1, R¹ and R² are independently hydrogen, alkyl or phenyl and X is an alkoxy group.

4. (Currently amended) The process according to claim [[2]] 1, wherein the organosilane is selected from the group consisting of tetraalkoxysilane, monoalkyltrialkoxysilane, dialkyldialkoxysilane, ~~trialkylmonealkoxysilane~~ ~~trialkylmonoalkoxysilane~~, trialkoxysilane, monoalkyldialkoxysilane, and a mixture thereof.

5. (Currently amended) The process according to claim [[2]] 1, wherein the organic bridged silane is synthesized by hydrosilylation reaction between a silane precursor containing a Si-H with a silane monomer containing aliphatic unsaturated carbon (-CH=CH₂-) in the presence of a catalyst.

6. (Currently amended) The process according to claim [[2]] 1, wherein the cyclic oligomer with organic bridged unit is synthesized by Grignard reaction of alkylhalide containing silane precursor.

7. (Currently amended). The process according to claim [[2]] 1, wherein the cyclic oligomer with organic bridge unit (Si-M-Si) is synthesized by [[the]] hydrosilylation reaction of a silane precursor containing a Si-H with an oligomer of ring structure (I) and/or (II):



wherein L₁ is alkenyl, L₂ is hydrogen, alkyl or aryl, M₁ is alkenyl, and M₂ is hydrogen, alkyl or aryl.

8. (Canceled)

9. (Currently amended) The process according to claim [[8]] 1, wherein the organic part of the pore-forming material contains organic linkage groups that can be decomposed at 200 to 500°C.

10. (Currently amended) The process according to claim 1, wherein the step a) comprises

partially hydrolyzing and condensing the matrix resin in an organic solvent after ~~the addition of adding~~ water and catalyst; and adding the pore-forming material to partially hydrolyzed condensate of the matrix resin; or

partially hydrolyzing and condensing the mixture of the matrix resin and pore-forming material in an organic solvent after ~~the addition of adding~~ water and catalyst.

11. (Original) The process according to claim 10, wherein the molecular weight of the partially hydrolyzed condensate product of the matrix resin or a mixture of the matrix resin and the pore-forming material is 500 to 1,000,000 as a weight average molecular weight.

12. (Canceled)

13. (Canceled)

14. (Original) The process according to claim 1, wherein the step c) comprises: heating the mixed complex to 150 to 350°C to effect curing without significant thermolysis; and

 further heating the cured complex to 350 to 600°C to effect thermolysis of the organic molecule part of the pore-forming material.

15. (Currently amended) The process according to claim 1, wherein the step c) comprises heating the mixed complex to 350°C up to the lesser of decomposition temperature of the matrix resin to simultaneously effect [[the]] curing of the complex and thermolysis of the organic molecule part of the pore-forming material.

16. (Withdrawn) An interlayer insulating film for metal wiring of a semiconductor, said film being prepared according to the process of claim 1.

17. (Withdrawn) An interlayer insulating film metal wiring of a semiconductor, said film being prepared according to the process of claim 2.

18. (Withdrawn) The interlayer insulating film according to claim 16, wherein the film has a dielectric constant of less than 3.3.

19. (Withdrawn) The interlayer insulating film according to claim 16, wherein the film has a median pore diameter less than 20 nm.

20. (Withdrawn) A semiconductor device comprising an interlayer insulating film for metal wiring, said film being prepared according to the process of claim 1.

21. (Withdrawn) A semiconductor device comprising an interlayer insulating film for metal wiring, said film being prepared according to the process of claim 2.

22. (New) The process according to claim 1, wherein the thermally decomposable organic linkage groups are selected from ether group, ester group, amide group, carbonate group, carbamate group, anhydride group, amine group, enamine group containing, imine, azo group, thio-ether group, sulfone group, sulfoxide group, isocyanate group, isocyanurate group, triazine group, acid group, and epoxy group.

Applicant : Min-Jin Ko et al.
Serial No. : 09/844,553
Filed : April 27, 2001
Page : 7 of 7

Attorney's Docket No.: 13135-002001 / OPP 010372
US

Please apply any charges to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 12-23-02

Y. Rocky Tsao
Y. Rocky Tsao, Ph.D., J.D.
Attorney for Applicants
Reg. No. 34,053

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

20774053.doc

Notice of Allowability DEC 29 2003



| | | |
|-----------------|--------------|--|
| Application No. | Applicant(s) | |
| 09/844,553 | KO ET AL. | |
| Examiner | Art Unit | |
| Thanh V Pham | 2823 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS. This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. This communication is responsive to the Amendment filed 11/06/03.

2. The allowed claim(s) is/are 1,3-7,9-11 and 14-16, 14-15 and 22

3. The drawings filed on _____ are accepted by the Examiner.

4. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some* c) None of the:

1. Certified copies of the priority documents have been received.

2. Certified copies of the priority documents have been received in Application No. _____.

3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____

5. Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

(a) The translation of the foreign language provisional application has been received.

6. Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

7. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

8. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

(a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

1) hereto or 2) to Paper No. _____.

(b) including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.

(c) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the margin according to 37 CFR 1.121(d).

9. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1 Notice of References Cited (PTO-892)

2 Notice of Draftsperson's Patent Drawing Review (PTO-948)

3 Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No. _____

4 Examiner's Comment Regarding Requirement for Deposit
of Biological Material

5 Notice of Informal Patent Application (PTO-152)

6 Interview Summary (PTO-413), Paper No. _____

7 Examiner's Amendment/Comment

8 Examiner's Statement of Reasons for Allowance

9 Other



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/844,553 | 04/27/2001 | Min-Jin Ko | 13135-002 Q01 | 3033 |

26161 7590 11/26/2003

FISH & RICHARDSON PC
225 FRANKLIN ST
BOSTON, MA 02110

EXAMINER

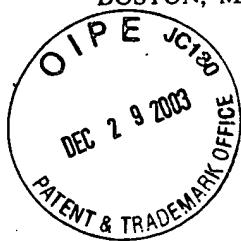
PHAM, THANH V

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 11/26/2003



Please find below and/or attached an Office communication concerning this application or proceeding.

RECEIVED

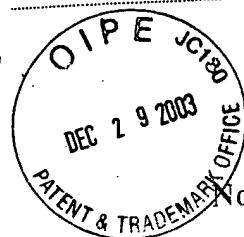
DEC 01 2003

FISH & RICHARDSON, P.C.
BOSTON OFFICE

| | |
|------------------------------|----------|
| DOCKETED BY PRACTICE SYSTEMS | |
| Action Code | Resonse |
| Base Date | 11-26-03 |
| Due Date | - |
| Deadline | 12-26-03 |
| Initials | dm On |



UNITED STATES PATENT AND TRADEMARK OFFICE



COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. Box 1450
ALEXANDRIA, VA 22313-1450
www.uspto.gov

Paper No. _____

Notice of Non-Compliant Amendment (37 CFR 1.121)

The amendment document filed on 11-06-03 is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121, as amended on June 30, 2003 (see 68 Fed. Reg. 38611, Jun. 30, 2003). In order for the amendment document to be compliant, correction of the following item(s) is required. Only the corrected section of the non-compliant amendment document must be resubmitted (in its entirety), e.g., the entire "Amendments to the claims" section of applicant's amendment document must be re-submitted. 37 CFR 1.121(h).

THE FOLLOWING CHECKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

1. Amendments to the specification:

A. Amended paragraph(s) do not include markings.
 B. New paragraph(s) should not be underlined.
 C. Other _____

2. Abstract:

A. Not presented on a separate sheet. 37 CFR 1.72.
 B. Other _____

3. Amendments to the drawings: _____

4. Amendments to the claims:

A. A complete listing of all of the claims is not present.
 B. The listing of claims does not include the text of all claims (including withdrawn claims).
 C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified.
 D. The claims of this amendment paper have not been presented in ascending numerical order.
 E. Other: _____

For further explanation of the amendment format required by 37 CFR 1.121, see MPEP Sec. 714 and the USPTO website at <http://www.uspto.gov/web/offices/pac/dapp/ola/preognocite/officeflyer.pdf>.

If the non-compliant amendment is a **PRELIMINARY AMENDMENT**, applicant is given ONE MONTH from the mail date of this letter to supply the corrected section which complies with 37 CFR 1.121. Failure to comply with 37 CFR 1.121 will result in non-entry of the preliminary amendment and examination on the merits will commence without consideration of the proposed changes in the preliminary amendment(s). This notice is not an action under 35 U.S.C. 132, and this ONE MONTH time limit is not extendable.

If the non-compliant amendment is a reply to a **NON-FINAL OFFICE ACTION** (including a submission for an RCE), and since the amendment appears to be a *bona fide* attempt to be a reply (37 CFR 1.135(c)), applicant is given a **TIME PERIOD** of ONE MONTH from the mailing of this notice within which to re-submit the corrected section which complies with 37 CFR 1.121 in order to avoid abandonment. **EXTENSIONS OF THIS TIME PERIOD ARE AVAILABLE UNDER 37 CFR 1.136(a).**

If the amendment is a reply to a **FINAL REJECTION**, this form may be an attachment to an **Advisory Action**. **The period for response to a final rejection continues to run from the date set in the final rejection**, and is not affected by the non-compliant status of the amendment.

Benji Hawkins (703) 305-4759
Legal Instruments Examiner (LIE) Telephone No. _____